

Application for Research Grant

2 Title any Professor of Medicine and Director, Cardio-Respiratory Laboratory, University of Southern California School of Medicine, Los Angeles 15, Calif.

University of Southern California, School of Medicine 1212 Shatto Street, Los Angeles 17, California.

A Study of the Effects of Smoking on Pulmonary Functions, and on the Effect of the Smoking of Pipe Smokers on the Cardiovascular System, and the Effect of the Smoking of Pipe Smokers on the Cardiovascular System, and the Effect of the Smoking of Pipe Smokers on the Cardiovascular System.

5. Detailed Plan of Procedure (Use reverse side if additional space is needed): The purpose of the proposed project is to determine by physiological measurements the nature and extent of the changes in pulmonary function measurements which may be induced as a result of inhalation of tobacco smoke. The pulmonary function status will be evaluated by a battery of physiological tests which have been shown to have a wide range between the normal and the abnormal and to provide reliable criteria of the ability of the individual to get oxygen in and carbon dioxide out adequately both during rest and exercise. The individuals to be studied will consist of essentially normal volunteers and patients with different types of chronic pulmonary diseases both at rest and under mild to moderate stress with exercise tests employing both the step-up test and the treadmill. The method of studying the effects of smoke can be measured either before and after smoking in the usual manner and in excess and from breathing air containing tobacco smoke. The type of measurements to be obtained include lung volume measurements from spirogram recordings of total vital capacity, timed vital capacity, and maximal breathing capacity before and after bronchodilator. The residual air volume is determined by the oxygen open circuit method and duplicate checks of 100 cc. or less are obtained on each case. The alveolar nitrogen determination is made after seven minutes of oxygen breathing. The exhaled  $N_2$  curve is obtained after one deep breath of oxygen using the  $N_2$  meter and the electrical recorder. Resting and exercise

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arterial blood samples are obtained and the oxygen content and capacity and  $\text{CO}_2$  content determined on the Van Slyke manometric apparatus in duplicate. The arterial blood pH is determined on the Cambridge glass electrode. The hemoglobin is based on the oxygen capacity and spectrophotometric. Direct tension measurements of arterial blood oxygen and carbon dioxide using the Riley bubble method are performed. Direct recordings of blood pressure from the brachial artery including recording of the pressure pulse wave with the Statham gage and electronic pressure recorder. The pulmonary ventilation measurements include resting and exercise measurements of respiratory rate, heartbeat, minute ventilation, oxygen uptake, carbon dioxide output and the percent of oxygen extracted from the inspired air breathed. Detailed studies on the distribution of inspired gases by more precise methods of measurement as afforded by mass spectrometer analysis permitting the use of trace gases, such as helium and carbon dioxide, as indicated. The effect of bronchospasm on distribution of gases in the lungs, on pulmonary compliance and on the blood gas exchange in the alveoli appears to be an interesting aspect for investigation.

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## 6. Budget Plan:

TOBACCO INDUSTRY RESEARCH (25-4-52)  
 The Cardio-Respiratory Laboratory and all are trained in the method of blood sampling in the Van Slyke blood gas apparatus. A full-time research technician is employed.

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The Cardio-Respiratory Laboratory is located in the Hospital of the Good Samaritan at 1212 Shatto Street, Los Angeles 17, California. This laboratory is set up for pulmonary function measurements of all types including spirometry and cardiac catheterization. The laboratory is on a full-time basis and is not engaged in private practice. One assistant (M.D.) and three technicians (Cont.) are employed.

## 7. Anticipated Duration of Work:

Three years.

Major items of Permanent Equipment: 1 - Constant Temperature Water Bath Apparatus and Equipment for Gas Analyzers, 1 - Constant Temperature Water Bath Apparatus and Equipment for Direct Tension Measurements of O<sub>2</sub> and CO<sub>2</sub>.

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## 10. Additional Information (Including relation of work to other projects and other sources of supply)

The planned project is intimately concerned with the current activities of the Cardio-Respiratory Laboratory. Pulmonary function studies are being performed daily on patients with emphysema, pneumoconiosis, asthma, and similar medical diseases. In addition, pulmonary function studies are being carried out on pre- and post-operative patients in the field of pulmonary surgery.

Our association with the Biologic Effects of Air Pollution project as mentioned above also provides experimental and clinical subjects for the study of respiratory function following experimental and naturally occurring exposure to air pollutants. This phase of the work is being supported as part of the Air Pollution study.

Attached is the Curriculum Vitae of the principal investigator and a list of his publications.

The principal investigator is a full-time research scientist in the Cardio-Respiratory Laboratory. He is also a full-time research scientist in the Biologic Effects of Air Pollution project. He is also a full-time research scientist in the field of pulmonary surgery.

Signature: Hurley L. Motley /s/  
 Director of Project

Overhead

Major Items of Permanent Equipment; 5 - Manometric Van Slyke; 3 - Scholander Gas Analyzers, 1 - Constant Temperature Water Bath Agitator and Equipment for Direct Tension Measurements of O<sub>2</sub> and CO<sub>2</sub>; 1 - Cambridge pH Meter Glass Electrode, 1 - Sanborn Direct Writing Electrocardiograph, 1 - 13 liter Collins Respirometer, 2 - 120 liter Tissot type Gasometer, 2 - Sanborn Benedict Bath type Metabolism Machines, 1 - Complete 5 channel Electrical Recorder for rates and pressure-volume relationships (pulmonary compliance), 1 - Bennett type Intermittent Positive Pressure Breathing Units (1 - equipped with air compressor and expiratory valve housing for collecting expired air), 2 - Residual Air Combination Valve Assemblies for the oxygen open circuit method, 1 - Beckman DU Model Spectrophotometer with Fisher Power Supply, 1 - International Centrifuge, 1 - Waters Conley Oximeter, double scale unit, with cuvette and earpiece, 1 - Waters Conley Nitrogen Meter, 1 - Beckman Oxygen Analyzer, 1 - portable treadmill and 1 - Fluoroscope. 1 - Liston-Becker Model 16 CO<sub>2</sub> Analyzer with special Esterline-Angus Recorder.

\* blood pressures, electrocardiograms, stethocardiograms, airflow

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The planned project is intimately concerned with the current activities of the Cardio-respiratory Laboratory. Pulmonary function studies are being performed daily on patients with emphysema, chronic bronchitis, asthma, and other medical diseases. In addition, pulmonary function studies are being carried out on new and post-operative patients in the field of pulmonary surgery.

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Attached, in the Curriculum Vitae of the principal investigator and a list of his publications, are the following information:

Director of Public Health

Brazilian Official of the Institution

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